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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,264	08/02/2007	August Van Gysel	4145-35	2096

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EXAMINER	
MCCARTY, PATRICK M	
ART UNIT	PAPER NUMBER
4126	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/578,264	VAN GYSEL ET AL.	
	Examiner	Art Unit	
	PATRICK MCCARTY	4126	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on 05/04/2006 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The use of the trademark PERVAP has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

2. Claim 10 is objected to because of the following informalities: The independent claim number is missing. For the purpose of examination this claim is assumed to be dependent on claim 8.

3. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-7 and 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 4 recites a limitation for the distillation steps A’ and C’ in claim 1. There is insufficient antecedent basis for this limitation in the claim.

7. Claims 5-7 recite limitations for the distillation step A' in claim 1. There is insufficient antecedent basis for this limitation.

8. Claim 13 recites a limitation for the distillation steps A' and A" in claim 1. There insufficient antecedent basis for this limitation in the claim.

9. Claims 14-15 recite limitations for the distillation steps C' and C" in claim 1. There is insufficient antecedent basis for this limitation in the claim. Further, claim 15 recites the limitation "or the pure acetonitrile being drawn as vapor and condensed after the additional distillation" in claim 1. There is insufficient antecedent basis for this limitation in the claim.

10. For the purpose of examination claims 4-7 and 13-15 are assumed to refer to only steps A and C of claim 1.

11. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131

USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 10 recites the broad recitations "wherein the pressure during the distillation of step A" is between 150 and 400 mbar" and "water content between 7.0% by weight and 13% by weight", and the claim also recites "between 200 and 220 mbar" and "between 8.5 and 9.5% by weight" which are the narrower statements of the ranges/limitations.

13. For the purpose of examination the ranges of 150-400 mbar and 7.0 - 13% water content by weight are used.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. Claims 1-4, 7, 12-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miles (US 6,395,142) in view of Field et al.

17. Regarding claim 1, Miles teaches a process for purifying low grade acetonitrile using two distillation columns, wherein acetonitrile and a first set of impurities are drawn from the top of the first column and fed to a second column where acetonitrile is recovered from the bottom (Miles, column 2 lines 63-67 and column 3 lines 1-6).

18. Miles does not explicitly teach that the low grade acetonitrile feed comprises 16% to 90% water by weight and Miles does not teach the use of a pervaporation unit to decrease water content. However, Miles teaches that raw acetonitrile with up to 50% water by weight can be purified (Miles, column 1 lines 18-19 with column 8 lines 30-60). A prima facie case of obviousness exists where the claimed ranges and prior art ranges overlap or are close enough that one skilled in the art would have expected them to have the same properties. See MPEP 2144.05 I.

19. Miles teaches that the low grade acetonitrile is first passed through a dehydrator in order to decrease the water content of the acetonitrile to below 16% by weight and thereby break the acetonitrile-water azeotrope (Miles, column 8 lines 58-64). Miles also teaches that the dehydrator is placed between the two distillation columns (Miles, claim 10). Further, Field teaches the use of a pervaporation unit placed between two distillation columns in order to dehydrate a mixture being fed into the second column in order to break the azeotrope of the mixture (Field, page 191 column 2 lines 33-41 and page 194 lines 39-42).

20. Therefore, it would have been obvious to the person of ordinary skill in the art at the time of the invention to modify the acetonitrile purification process taught by Miles by using the setup taught by Field, wherein a pervaporation unit is used as a dehydrator

and placed between the columns, thus allowing for an economical way of purifying acetonitrile with a water content above 16% by weight.

21. Regarding claim 2, Miles does not explicitly teach using a side draw to pass acetonitrile and impurities to the second column. However, Miles teaches using a plurality of stages in the first distillation column for rectifying acetonitrile and a first set of impurities (Miles column 4, lines 29-33 and claim 2). Therefore, it would have been obvious to person of ordinary skill in the art at the time of the invention to add additional stages to the column and take the acetonitrile and first set of impurities as side draw in order to remove the more volatile impurities prior to being fed to subsequent steps.

22. Regarding claim 3, Field teaches recycling the top of the second column to the feedstock (Field, page 195 figure 7).

23. Regarding claim 4, Miles teaches the use of separate columns (Miles, column 2 lines 63-67 and column 3 lines 1-6).

24. Regarding claim 7, Field teaches recycling the permeate of the pervaporation unit back to the feedstock (Field, page 195 figure 7).

25. Regarding claim 12, Miles teaches that raw acetonitrile is purified in his invention with the use of a dehydrator (Miles, column 8 lines 30-60). Miles teaches that raw acetonitrile typically contains up to 50% water by weight (Miles, column 1 lines18-19). A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would expect them to have the same properties. Therefore, It would have been obvious at the time of the

invention to use the process taught by Miles modified using the setup taught by Field to purify acetonitrile feedstocks which contain greater than 50% water by weight.

26. Regarding claim 13, Miles teaches altering the pH of the feedstock (Miles, column 8 lines 65-67)

27. Regarding claim 15, Miles teaches the use of activated carbon as a polishing step (Miles, column 7 lines 28-30).

28. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miles (US 6,395,142) in view of Field et al. as applied to Claim 1, and in further view of Nakamura (US 5,629,443).

29. Regarding claim 14, Miles and Field teach claim 1 but do not teach the use of an additional distillation after the second column. However, Nakamura teaches the removal of high boiling compounds from acetonitrile by using two distillation columns (Nakamura, column 5 lines 45-62). Therefore, it would have been obvious to the person of ordinary skill in the art at the time of the invention to add an additional column in order to further decrease the concentration of high boiling impurities.

30. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miles (US 6,395,142) in view of Field et al. as applied to Claim 1 and in further view of Matsumoto (JP 63004807 A).

31. Regarding claim 5, Miles and Field teach claim 1 but do not explicitly teach condensing the acetonitrile/water azeotrope prior to sending it to the pervaporation unit. However, Matsumoto teaches a process for recovering a solvent in a solvent-water system having an azeotropic point. The process includes a pervaporation step, a

distillation step, and a condensing step in which the product stream is condensed prior to being sent to the pervapoation step (Matsumoto, abstract and figure 1). Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to condense the feed to the pervaporation unit in order to improve performance.

32. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miles (US 6,395,142) in view of Field et al. as applied to Claim 1 and in further view of Pettersen et al.

33. Regarding claim 6, Miles and Field teach claim 1 but do not teach sending the acetonitrile/water azeotrope and low boiling impurities to the pervaporation unit as vapor under pressure. However, Pettersen teaches that the transport rates across the membrane surface are enhanced by raising the feed pressure (Pettersen, page 21 column 2 lines 12-14). Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to send the vapor feed under pressure to the pervaporation unit in order to improve performance.

34. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Presson (US 4,362,603) in view of Miles (US 6,395,142).

35. Regarding claim 8, Presson teaches a method for the purifying acetonitrile containing more than 15% water by weight using a pressure-swing distillation (Presson, column 4 lines 48-63). Presson teaches that the acetonitrile feedstock contains low and high boiling impurities ("low boiling" read on by “acetone”, etc. and “high boiling” read on by “allyl alcohol”, etc. Presson, column 1 lines 10-12)

36. Presson does not explicitly teach that the first acetonitrile/water azeotrope is taken as side draw nor does Presson explicitly state that the purified acetonitrile is recovered as the second column's bottoms. However, Miles teaches using a plurality of stages in the first distillation column for rectifying acetonitrile and a first set of impurities (Miles column 4, lines 29-33 and claim 2). It would have been obvious to person of ordinary skill in the art at the time of the invention to add additional stages to the column and take the acetonitrile and first set of impurities as side draw in order to remove the more volatile impurities prior to being fed to subsequent steps. Similarly, the location of drawing purified acetonitrile could be adjusted in the second column.

37. Presson does not teach that the second distillation is conducted at atmospheric pressure. Presson teaches the second distillation is conducted at a pressure above 1 atmosphere, however, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would expect them to have the same properties. See MPEP 2144.05 I. Therefore, It would have been obvious at the time of the invention to use the process taught by Presson in which the second distillation is conducted at atmospheric pressure in order to improve the performance of the process for a given acetonitrile feedsock.

38. Regarding claim 9, Presson and Miles teach claim 8, however, Presson does not explicitly teach the use of separate columns. Presson teaches the use distillation zones (Presson, column 4 lines 48-63) to conduct the distillations at different pressures. One of ordinary skill in the art would recognize that these "zones" could be located in the same column using a stepwise process or in separate columns using a continuous

process. Therefore, it would have been obvious to the person of ordinary skill in the art at the time of the invention to use two separate columns in order to facilitate a continuous process. Further, Miles teaches the use of separate columns (Miles, column 2 lines 63-67 and column 3 lines 1-6).

39. Regarding claim 10, Presson teaches that pressure in the low pressure column is 0.1 to 10 psia (7 -690 mbar).

Regarding claim 11, Presson teaches recycling the acetonitrile/water azeotrope leaving the second distillation zone to the feedstock of the first distillation zone (Presson, column 4 lines 64-65).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICK MCCARTY whose telephone number is (571)270-1141. The examiner can normally be reached on M-F 9:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571)-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PATRICK MCCARTY/
Examiner, Art Unit 4126

March 25, 2011

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1732